



Early Journal Content on JSTOR, Free to Anyone in the World

This article is one of nearly 500,000 scholarly works digitized and made freely available to everyone in the world by JSTOR.

Known as the Early Journal Content, this set of works include research articles, news, letters, and other writings published in more than 200 of the oldest leading academic journals. The works date from the mid-seventeenth to the early twentieth centuries.

We encourage people to read and share the Early Journal Content openly and to tell others that this resource exists. People may post this content online or redistribute in any way for non-commercial purposes.

Read more about Early Journal Content at <http://about.jstor.org/participate-jstor/individuals/early-journal-content>.

JSTOR is a digital library of academic journals, books, and primary source objects. JSTOR helps people discover, use, and build upon a wide range of content through a powerful research and teaching platform, and preserves this content for future generations. JSTOR is part of ITHAKA, a not-for-profit organization that also includes Ithaka S+R and Portico. For more information about JSTOR, please contact support@jstor.org.

SOLUTION BY J. L. RILEY, Stephenville, Texas.

Evaluating the first determinant, we have $[R(R - 2ay^2 - 2bu^2)]^2$, where

$$R = x^2 + ay^2 + bu^2 + abv^2.$$

The second determinant, when expanded, gives $a[-2R(xy + buv)]^2$; the third gives $b[2R(avu - ux)]^2$; the fourth gives 0; and the fifth determinant gives $[-R^2]^2$. But

$$[R(R - 2ay^2 - 2bu^2)]^2 + a[-2R(xy + buv)]^2 + b[2R(avu - ux)]^2 \neq [-R^2]^2$$

unless $(ay^2)(bu^2) = 0$. Hence the relation stated in the problem does not always hold.

520 (Geometry). Proposed by ALBERT A. BENNETT, University of Texas.

On a given tangent to a circle determine a point such that, if a secant be drawn joining this point to the extremity of the diameter which is perpendicular to the given tangent, the segment of this secant exterior to the circle will be equal in length to a given segment.

SOLUTION BY A. M. HARDING, University of Arkansas.

Let us denote the radius of the given circle by r and the length of the given segment by $2d$. Let AB be the diameter perpendicular to the tangent at the point of tangency A . Take a length $AC = d$ along the tangent from A . Join BC . Take D on CB so that $CD = d$. With center at B draw arc DE cutting the circle at E . Produce BE to cut the tangent at P . Then P is the required point.

Proof:

$$BE = BD = \sqrt{d^2 + 4r^2} - d.$$

Since AE is perpendicular to BP it follows that

$$AB^2 = BE \times BP = BE(BE + EP).$$

Hence,

$$4r^2 = (\sqrt{d^2 + 4r^2} - d)(\sqrt{d^2 + 4r^2} - d + EP).$$

From this equation we find

$$EP = 2d.$$

Note: If a point Q be taken on the tangent such that $AQ = AP$, this point Q will also satisfy the conditions of the problem.

Also solved by MAY PHALOR, H. T. AUDE, HERBERT N. CARLETON, OSCAR S. ADAMS, H. C. FEEMSTER, and PAUL CAPRON.

521 (Geometry). Proposed by R. M. MATHEWS, Riverside, Cal.

A variable circle, with center on the line l and passing through a fixed point P , cuts a fixed circle in A and B . Prove that the common chord AB and the perpendicular to l through P intersect in a fixed point.

SOLUTION BY L. E. MENSENKAMP, Freeport, Illinois

It is convenient to employ rectangular coördinates. Let l be taken as the axis of x and the point P on the y -axis; then the perpendicular to l through P is the axis of y . Under these conditions, it follows from elementary analytic geometry that the equation of the variable circle is

$$(x - \alpha)^2 + y^2 = r^2,$$

where r is the radius of the variable circle. The equation of the fixed circle may be taken as

$$(x - a)^2 + (y - b)^2 = c^2.$$

Subtracting the first equation from the second, we get

$$2(\alpha - a)x - 2by = c^2 - a^2 + \alpha^2 - r^2 - b^2,$$